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(54) Title: UPGRADEABLE REMOTE CONTROL		
(57) Abstract		
<p>A remote control system includes: a remote device having a CPU, a memory coupled to the CPU for storing operating software and code data for controlling external devices, and keys coupled to the CPU for inputting commands to the remote device; a receiver on the remote device being coupled to the CPU for receiving at least one of operating software and code data over a wireless communication link and transmitting the at least one of operating software and code data to the CPU for decoding; and a transmitter on the remote device being coupled to the CPU for transmitting control data to the external devices, and for transmitting data to an updater; wherein the updater has an updater receiver for receiving data from the transmitter of the remote device and an updater transmitter for transmitting the at least one of operating software and code data to the receiver on the control device.</p>		

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UPGRADEABLE REMOTE CONTROL**BACKGROUND OF THE INVENTION****Field of the Invention**

The present invention relates to a remote control and more particularly to a remote control that can be upgraded through a data transmission system that inputs operating software and data into the remote control.

Discussion of the Related Art

Conventional remote controls have been made reconfigurable such that they have the ability to learn, store, and repeat remote control codes from other such remote controls. These conventional remote control devices generally include an infrared receiver, a microprocessor, a non-volatile RAM, a scratch pad RAM, and an infrared transmitter. Accordingly, these types of remote controls only capture a "free format" infrared signal of an existing remote control and then play back that signal at a later time.

During the learning process, the infrared receiver decodes transmissions from another host remote control, associates each transmission with a particular button or key or the reconfigurable remote control, and stores the data encoded within the transmitted signal in memory. Thus, the user trains the conventional reconfigurable remote control by first processing a "learn" button. The button to be reconfigured in the remote control is then processed, followed by depression of the associated button on the host remote control. The user must accurately gauge successful transmission, reception, and data storage between units. The process is conducted separately to train each individual button on the remote control, and in some systems, must be

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operated at least twice for each button to ensure proper reception and decoding. For a conventional, reconfigurable remote control, the learning process to effectuate commands from another remote control can be repetitive and tiring.

For the conventional remote control, the operating system software in the unit
5 remains unchanged, and only the particular data relating to commands associated with particular, individual buttons are reconfigured. In other words, the data received by the remote control during the learning process does not represent instructions, but is instead the actual transmitted signal from the host remote control. Therefore, the conventional remote control stores the transmitted signal associated
10 with a particular key or button in order to mimic or repeat that signal later during operation.

Another conventional remote control has been made upgradeable by transmitting control data for operating other devices to a remote control via a cable directly to a computer, or via a telephone modem. However, data transmission is
15 one-way only, from the computer to the remote control. Further, this conventional, upgradeable remote control system requires a physical attachment through interlocking pieces during the upgrading process. These connecting pieces may become damaged, and the necessary separate cable may become damaged or lost. The remote control unit also must have a dedicated portion that allows for
20 interconnection and engagement with the separate, interlocking components. This utilizes spaces on the portable unit, and requires careful designing so as not to cause an unattractive appearance for the unit.

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SUMMARY OF THE INVENTION

Accordingly, the present invention is directed to a remote control that substantially obviates one or more of the problems due to limitations and disadvantages of the related art.

5 An object of the present invention is to provide a system for updating the operating software and data contained in a remote control type device via an infrared link.

Another object of the present invention is to provide a system for updating the operating software or data contained in a remote control type device via a radio 10 frequency link.

Another object of the present invention is to provide a system for two-way communication between a receiving remote control type device and a device in which operating software and code data are stored and sent.

Yet another object of the present invention is to provide a system for 15 automatically updating the operating software in a remote control type device through a wireless communication link.

Additional features and advantages of the invention will be set forth in the description which follows, and in part will be apparent from the description, or may be learned by practice of the invention. The objectives and other advantages of the 20 invention will be realized and attained by the system and method pointed out in the written description and claims hereof as well as the appended drawings.

To achieve these and other advantages and in accordance with the purpose of the present invention, as embodied and broadly described, a remote control system

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includes a remote device having a CPU, a memory coupled to the CPU for storing operating software and code data for controlling external devices, and keys coupled to the CPU for inputting commands to the remote device; a receiver on the remote device being coupled to the CPU for receiving at least one of operating software and code data over a wireless communication link and transmitting the at least one of operating software and code data to the CPU for decoding; and a transmitter on the remote device being coupled to the CPU for transmitting control data to the external devices, and for transmitting data to an updater; wherein the updater has an updater receiver for receiving data from the transmitter of the remote device and an updater transmitter for transmitting the at least one of operating software and code data to the receiver on the control device.

In another aspect of the present invention, a remote control system includes a remote device having a CPU, a memory coupled to the CPU for storing operating software and code data for controlling external devices, and keys coupled to the CPU for inputting commands to the remote device; a receiver on the remote device being coupled to the CPU for receiving at least one of operating software and code data over a wireless communication link and transmitting the at least one of operating software and code data to the CPU for decoding; and a transmitter on the remote device being coupled to the CPU for transmitting control data to the external devices; wherein the updater has an updater transmitter for transmitting the at least one of operating software and code data to the receiver on the control device.

In yet another aspect of the present invention, a method of upgrading a remote control includes the steps of transmitting at least one of operating software

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and control data from an updater transmitter on an updater device to a receiver on a remote device over a wireless communication link; receiving the at least one of operating software and code data through the receiver on the remote device and sending the received at least one of operating software and code data to a CPU in the 5 remote device; decoding the received at least one of operating software and code data in the CPU; and storing the decoded at least one of operating software and code data in a memory in the remote device.

In another aspect of the present invention, a method of communicating between a remote device and data unit includes the steps of transmitting 10 communication signals from an updater transmitter on a data unit to a receiver on a remote device over a wireless communication link; receiving the communication signals through the receiver on the remote device and sending the received signals to a CPU in the remote device; decoding the received signals in the CPU; determining if the communication signals request that the remote device perform operations; 15 performing operations requested by the communication signals; creating data responses resulting from the performed operations; and transmitting the data responses from a transmitter on the remote device to an updater receiver on the data unit via the communication link.

BRIEF DESCRIPTION OF THE DRAWINGS

20 The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this specification, illustrate embodiments of the invention and together with the description serve to explain the principles of the invention.

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In the drawings:

Fig. 1 is a block diagram showing a first preferred embodiment of the system for updating the operating software and data contained in a remote control type device via an IR communications link.

5 Fig. 2 is a block diagram showing a second preferred embodiment of the system for updating the operating software and data contained in a remote control type device via an RF communications link.

Fig. 3 is a block diagram showing a third preferred embodiment of the system for updating the operating software and data contained in a keyboard type device via 10 an IR communications link.

Fig. 4 is a block diagram showing a fourth preferred embodiment of the system for updating the operating software and data contained in a keyboard type device via an RF communications link.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

15 Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings.

In Fig. 1, the system for updating the operating software and data contained in a remote control type device includes a handheld remote control device 1. This device includes an infrared ("IR") transmitter 2 and an IR receiver 3. The remote control device also includes a set of pushbuttons or keys 4, a central processing unit 20 ("CPU") (not shown), and a memory (not shown). The system also includes an IR updater 10 in which operating software for the remote control device and code data for operating a variety of devices are stored. The IR updater 10 has IR transmitter

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13. The IR updater may also have an IR receiver 12 for two way communication during updating, although this is not required. The IR updater may be used as a stand alone unit or may be attached to an external computer ("PC") 200. The updater also can be an integrated component of the television, and can itself be updated via television signals received through satellite or cable transmissions.

5 In the first preferred embodiment, a formatted data stream that is known both to the remote control device 1 and the IR updater 10 is transmitted between the two devices over an IR link. For example, the IR transmitter 13 of the IR updater 10 transmits operating software or code data, and the IR receiver 3 of the remote control 10 device 1 receives that information coming in over the IR link. This received operating software or code data is appropriately processed and decoded in the CPU to update the operating software or code data, respectively, and is stored in the memory of the remote control device 1.

The data transmitted from the IR updater 10 also may contain commands that 15 request action from the remote control device 1. For example, the data transmitted to the remote control device 1 may require the remote control device to perform diagnostics and report the results. Thus, after receiving a command through the IR receiver 2, the remote control device 1 processes the command, runs the diagnostics, and transmits the results through the IR transmitter 2 to the IR receiver 12 of the IR 20 updater 10.

The signal transmitted from the updater, to the remote control, representing software or code data, is detected through at least one photodiode in the remote control. The photodiode, or plurality of photodiodes, can be placed within the

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vicinity of the diodes that transmit the signals from the remote control to the television or other appliances to be controlled by the remote control. The photodiode(s) is connected to a differentiating capacitor and a threshold amplifier.

The process for updating the remote control by updating the software is
5 greatly simplified as compared to reconfiguration of a conventional reconfigurable remote control unit. The user first activates the "learning mode" for the remote control. This can be done by pressing a single key on the remote control unit.

The user then activates the updater. The remote control is positioned to facilitate IR communication between the updater and the remote control. Ideally, the
10 remote control is placed on a stationary surface with the photodiode facing the transmitter in the updater, and approximately five feet from the updater. The updating process can also be performed while the user holds on to the remote control. Depending on the complexity of software to be updated, the communication time may require only seconds. During this time, commands for every operation of
15 the remote control can be modified or altered. Alternatively, the updating process may only modify a select portion of features, or add new commands or features.

The remote control device also will transmit signals from the IR transmitter 2 to control external appliances, the signals being based upon commands input through the keys 4 of the remote control device.

20 The remote control according to the present invention can be designed for one way communication or two way communication with full handshaking. For one way communication the signal is transmitted from the updater to the remote control during the updating process and the remote control only receives the updated

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software or code data. With two-way communication, the remote control sends signals back to the updater during the updating process. These signals can include indicators indicating "ready to receive," "confirmation of receipt," or "request for updating." With either one way communication or bidirectional communication, the 5 updating process may conclude with an audible signal or visible signal on the updater to indicate completion of transmission, or a comparable signal on the remote control itself.

Fig. 2 is a second preferred embodiment of the present invention. The second embodiment is similar to the first embodiment in some respects; however, 10 radio frequency is used as the link between the remote control device and the updater. Therefore, the remote control 20 has a radio frequency ("RF") receiver 23 and an RF transmitter 22. The second embodiment also has an RF updater 30, which includes an RF transmitter 33 and an RF receiver 32. The transmission of operating software and code data in the second embodiment is updated via a radio link, and 15 may be performed in a similar manner and in the similar variations as discussed for the first embodiment.

Fig. 3 is a third embodiment of the present invention. Instead of a handheld remote control device, the third embodiment includes a keyboard 40 that has a CPU 20 and memory (not shown), an IR transmitter 42, and an IR receiver 43. The keyboard preferably functions in a similar way as that explained for the remote control device of the first embodiment, wherein operating software and code data is transmitted from an IR updater 10 to the keyboard 40 via an IR link.

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Specifically, the IR receiver 43 of the keyboard 40 receives the information coming in over the IR link. This received operating software or code data is appropriately processed and decoded in the CPU to update the operating software or code data, respectively, and is stored in the memory of the keyboard 40.

5 The data transmitted from the IR updater 10 also may contain commands that request action from the keyboard 40. For example, the data transmitted to the keyboard 40 may require the keyboard 40 to perform diagnostics and report the results. Thus, after receiving a command through the IR receiver 43, the keyboard 40 processes the command, runs the diagnostics, and transmits the results through
10 the IR transmitter 42 to the IR receiver 12 of the IR updater 10.

The keyboard 40 also is capable of transmitting signals from the IR transmitter 42 to control external appliances, the signals being based upon commands input through the keys 44 of the keyboard.

Fig. 4 is a fourth embodiment of the present invention. This figure shows a
15 system for updating data contained in a keyboard 50 using an RF updater 30. The keyboard 50, therefore, has an RF receiver 53 and an RF transmitter 52. The RF updater 30 may be similar to that discussed above with respect to the second embodiment. The transmission of operating software and code data in the fourth embodiment is updated via a radio link, and is preferably performed in a similar manner and in the similar variations as discussed for the third embodiment.
20

As an additional embodiment, the remote device may be automatically updated as soon as the updater device is powered on, without requiring additional

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steps by the user. This feature may be particularly useful if the updater is a component within a television or another appliance controller.

5

It will be apparent to those skilled in the art that various modifications and variations can be made in the system and method for updating a remote control type device of the present invention without departing from the spirit or scope of the invention. Thus, it is intended that the present invention cover the modification and variations of this invention provided they come within the scope of the appended claims and their equivalents.

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What is claimed is:

1. A remote control system comprising:
 - a remote device having a CPU, a memory coupled to the CPU for storing operating software and code data for controlling external devices, and keys coupled to the CPU for inputting commands to the remote device;
 - a receiver on the remote device being coupled to the CPU for receiving at least one of operating software and code data over a wireless communication link and transmitting the at least one of operating software and code data to the CPU for decoding; and
- 10 a transmitter on the remote device being coupled to the CPU for transmitting control data to the external devices, and for transmitting data to an updater; wherein the updater has an updater receiver for receiving data from the transmitter of the remote device and an updater transmitter for transmitting the at least one of operating software and code data to the receiver on the control device.
- 15 2. The remote control system of claim 1, wherein the remote device is a handheld remote control device.
3. The remote control system of claim 1, wherein the remote device is a keyboard.
4. The remote control system of claim 1, wherein the wireless communication link is an IR link.
- 20 5. The remote control system of claim 4, wherein the receiver is an IR receiver, the transmitter is an IR transmitter, the updater receiver is an IR receiver, and the updater transmitter is an IR transmitter.

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6. The remote control system of claim 1, wherein the wireless communication link is an RF link.

7. The remote control system of claim 6, wherein the receiver is an RF receiver, the transmitter is an RF transmitter, the updater receiver is an RF receiver, and the updater transmitter is an RF transmitter.

5 8. The remote control system of claim 1, wherein the updater is a component on a television.

9. The remote control system of claim 1, wherein the updater is a component on a personal computer.

10 10. A remote control system comprising:

a remote device having a CPU, a memory coupled to the CPU for storing operating software and code data for controlling external devices, and keys coupled to the CPU for inputting commands to the remote device;

15 a receiver on the remote device being coupled to the CPU for receiving at least one of operating software and code data over a wireless communication link and transmitting the at least one of operating software and code data to the CPU for decoding; and

a transmitter on the remote device being coupled to the CPU for transmitting control data to the external devices;

20 wherein the updater has an updater transmitter for transmitting the at least one of operating software and code data to the receiver on the control device.

11. The remote control system of claim 10, wherein the remote device is a handheld remote control device.

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12. The remote control system of claim 10, wherein the remote device is a keyboard.

13. The remote control system of claim 10, wherein the wireless communication link is an IR link.

5 14. The remote control system of claim 13, wherein the receiver is an IR receiver, the transmitter is an IR transmitter, the updater receiver is an IR receiver, and the updater transmitter is an IR transmitter.

15. The remote control system of claim 10, wherein the wireless communication link is an RF link.

10 16. The remote control system of claim 15, wherein the receiver is an RF receiver, the transmitter is an RF transmitter, the updater receiver is an RF receiver, and the updater transmitter is an RF transmitter.

17. The remote control system of claim 10, wherein the updater is a component on a television.

15 18. The remote control system of claim 10, wherein the updater is a component on a personal computer.

19. A method of upgrading a remote control, comprising the steps of: transmitting at least one of operating software and control data from an updater transmitter on an updater device to a receiver on a remote device over a 20 wireless communication link;

receiving the at least one of operating software and code data through the receiver on the remote device and sending the received at least one of operating software and code data to a CPU in the remote device;

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decoding the received at least one of operating software and code data in the

CPU; and

storing the decoded at least one of operating software and code data in a
memory in the remote device.

5 20. The method of claim 19, wherein the remote device is a handheld
remote control device.

21. The method of claim 19, wherein the remote device is a keyboard.

22. The method of claim 19, wherein the wireless communication link is
an IR link.

10 23. The method of claim 22, wherein the receiver is an IR receiver and
the updater transmitter is an IR transmitter.

24. The method of claim 19, wherein the wireless communication link is
an RF link.

15 25. The method of claim 24, wherein the receiver is an RF receiver and
the updater transmitter is an RF transmitter.

26. The method of claim 19, wherein the updater is a component on a
television.

27. The method of claim 19, wherein the updater is a component on a
personal computer.

20 28. A method of communicating between a remote device and a data unit,
comprising the steps of:

transmitting communication signals from an updater transmitter on a data
unit to a receiver on a remote device over a wireless communication link;

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receiving the communication signals through the receiver on the remote device and sending the received signals to a CPU in the remote device;

decoding the received signals in the CPU;

determining if the communication signals request that the remote device

5 perform operations;

performing operations requested by the communication signals;

creating data responses resulting from the performed operations; and

transmitting the data responses from a transmitter on the remote device to an

updater receiver on the data unit via the communication link.

10 29. The method of claim 28, wherein the remote device is a handheld remote control device.

30. The method of claim 28, wherein the remote device is a keyboard.

31. The method of claim 28, wherein the wireless communication link is an IR link.

15 32. The method of claim 31, wherein the receiver is an IR receiver, the transmitter is an IR transmitter, the updater receiver is an IR receiver, and the updater transmitter is an IR transmitter.

33. The method of claim 28, wherein the wireless communication link is an RF link.

20 34. The method of claim 33, wherein the receiver is an RF receiver, the transmitter is an RF transmitter, the updater receiver is an RF receiver, and the updater transmitter is an RF transmitter.

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35. The method of claim 28, wherein the updater is a component on a television.

36. The method of claim 28, wherein the updater is a component on a personal computer.

5 37. The method of claim 19, wherein the step of transmitting communication signals to the receiver of the remote device is automatic upon power on of the updater device.

38. The method of claim 28, wherein the step of transmitting communication signals to the receiver of the remote device is automatic upon power
10 on of the updater device.

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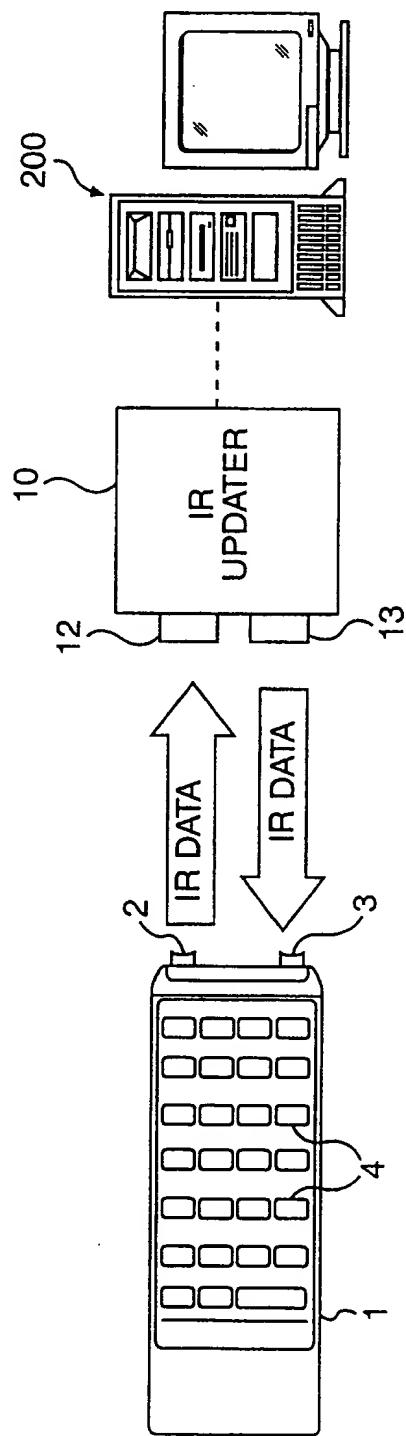


FIG. 1

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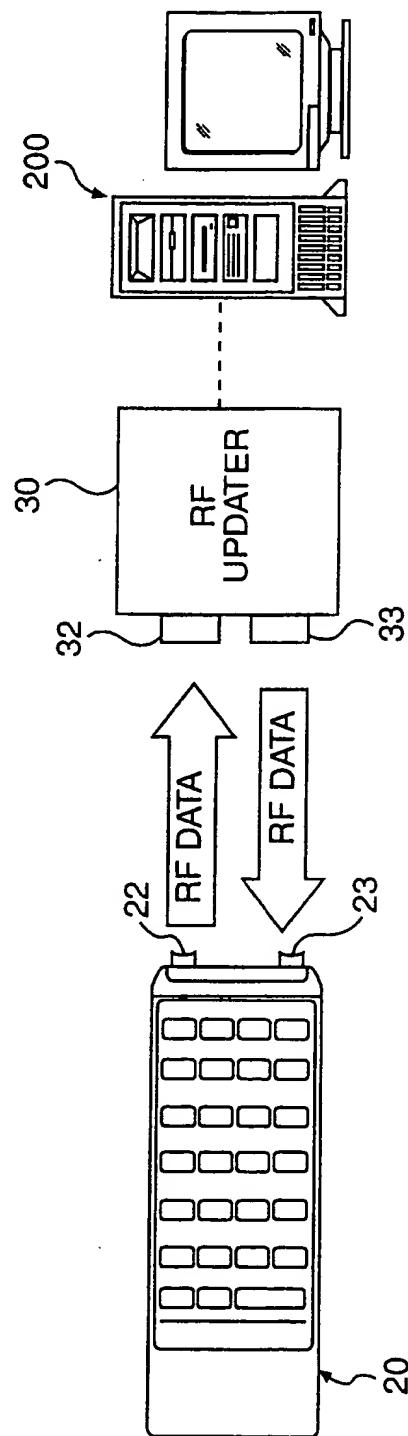


FIG. 2

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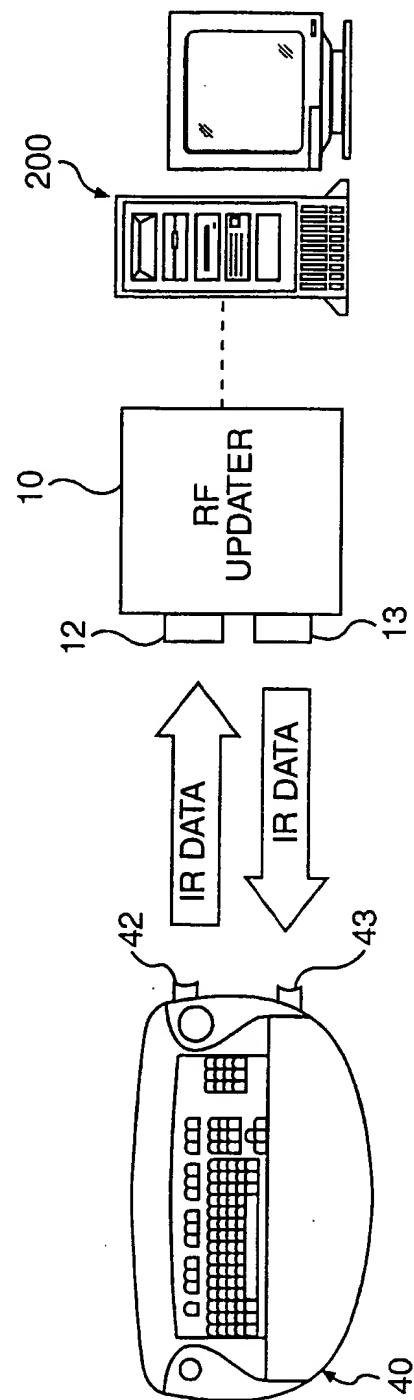


FIG. 3

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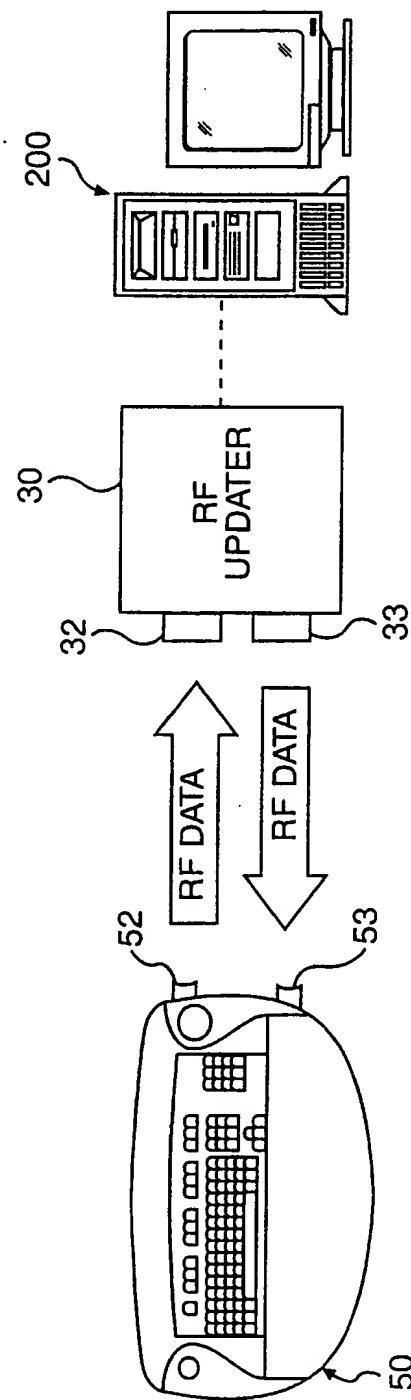


FIG. 4

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 99/06796

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 G08C19/28

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 G08C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 629 868 A (TESSIER ALAIN ET AL) 13 May 1997 (1997-05-13)	1, 2, 4-8, 10, 11, 13-17, 19, 20, 22-26
A	column 4, line 29 - column 6, line 33 column 7, line 10 - line 56	28, 29, 31-35
X	US 5 668 591 A (SHINTANI PETER) 16 September 1997 (1997-09-16)	1, 2, 4-7, 10, 11, 13-16, 19, 20, 22-25
A	column 3, line 1 - column 4, line 9 column 4, line 58 - column 6, line 28 ---	3, 12, 21, 28, 29, 31-34
		-/-

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Patent family members are listed in annex.

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28 July 1999	04/08/1999
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Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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INTERNATIONAL SEARCH REPORT

Information on patent family members

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